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Unmanned Aerial Vehicles: Force Multipliers

The Issue in Context

Unmanned Aerial Vehicles (UAVs) have soared to the forefront of military planning and operations across Western defence communities and beyond. Following their widespread use during Operation 'Allied Force' in Kosovo, a US Deputy Assistant Secretary for Defense commented: "UAVs ... have made themselves indispensable to the commanders in this operation and we cannot contemplate future combat or other military operations without them ... For the first time ever in warfare, commanders at all levels have had nearly continuous, real-time visibility of at least portions of the battlefield."[1]

With UAV technology now being successfully used by many modern defence forces, the Department of National Defence (DND) and the Canadian Forces (CF) need to seriously consider the applicability of using unmanned systems to complement assets across the spectrum of conflict.

Background

An UAV is an "aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be remotely piloted, can be expendable or recoverable, and can carry a lethal or non-lethal payload."[2] Tactical UAVs can provide close support to soldiers in theatre (e.g. to see over the next hill or around the next corner). Strategic UAVs function at long range with high endurance to provide intelligence, surveillance and reconnaissance (ISR).

Among the unique features of UAVs is their ability to operate without the threat of human fatalities in missions deemed too dangerous for conventional airborne systems. Employed as sensor or weapons platforms, UAVs extend engagement ranges and increase situational awareness. In operations other than war, they can survey areas unaffected by minefields, roadblocks or other obstacles. UAVs also have important non-military civilian applications for search and rescue, disaster and emergency management, and counter-drug operations.

Although unmanned aircraft have a history reaching back to the initial stages of World War I, the interest in UAVs has increased after their successful deployment in the Gulf War and more recently in Bosnia, where they continue to monitor compliance with the peace accord. In Kosovo, UAVs relayed invaluable details of troop dispositions, movements and targets to the allies. This led US Secretary of Defense William S. Cohen to call for a strong renewed commitment to them as a whole: "The opportunity is here to develop, acquire and integrate unmanned airborne reconnaissance capabilities into the force structure at a rapid, but prudent pace."[3]

The US has embraced the concept of unmanned aircraft and is placing emphasis on utilizing a number of UAV systems to support the warfighter, including *Hunter* and *Shadow 200* (tactical UAVs), the high altitude high endurance Global Hawk, and long endurance *Predator*. The US Air Force's long-term science and technology outlook, *New World Vistas*, predicts that within the next 10-15 years, uninhabited combat aircraft will be an operational reality.[4] Bird sized micro-air vehicles that can inspect the inside of buildings and systems capable of specialized applications (e.g. chemical/biological agent detection, ballistic missile interception) are also envisaged.

Many other countries, including the Netherlands, Japan, Israel, Italy, Saudi Arabia, France and Germany, are either using or experimenting with UAVs. Australia has a research program underway and future acquisition plans, while the medium-range *Phoenix* has

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entered service in the United Kingdom as a surveillance/targeting system and continues to support the Kosovo peacekeeping mission.

R&D Leadership

DND/CF have pursued unmanned air projects like UASTAS (Unmanned Air Surveillance and Target Acquisition System) for decades. In the past, defence scientists have been engaged in the research and development (R&D) related to UASTAS. The development of unmanned air vehicles like the CL-227 Sentinel with Canadair have their roots in the early work of the Defence Research Board (DRB, 1947-1974). Defence R&D Canada (DRDC) is now investigating concepts for remote surveillance and the technologies associated with UAVs by focusing research on sensors, communications and ground stations, where Canada's expertise is world class.

As part of these activities, DRDC scientists initiated the cooperative trials of *Global Hawk* in Canadian airspace with military sponsors from the air, land, sea, and space communities. The test flights will allow DND/CF to gain first-hand experience with strategic UAV operations and obtain surveillance data; assist the US in evaluating advanced sensors; investigate interoperability issues for coalition operations and coordination issues involving other national assets (i.e. ground stations, information management systems, satellites); and showcase potential national surveillance technology. The flights will assist DND/CF to conceive, develop and assess techniques, concepts and experimental tools for UAV systems.

The critical technologies, capability gaps and interoperability issues involved in using UAVs in joint/combined coalition operations are also being examined with other nations of The Technical Cooperation Program (TTCP) through joint experimentation trials and simulation-based exercises.[5] One example is the study of how UAVs might assist in the attack of a time-critical target, such as a mobile missile launcher. The outcomes of these studies will provide a basis for prioritizing future R&D in UAV technologies.

DRDC's *Technology Investment Strategy for 2010* focuses additional R&D direction on exploiting UAVs for the future battlespace under the activity "Autonomous Intelligent Systems." Key research areas include:

- Methods to perceive the environment;
- Intelligent planning and control systems; and
- Fusion with the overall command and control system.

Conclusion

As the Kosovo experience has shown, advanced UAVs will be key surveillance and tactical tools in future theatres of operation. Emerging developments in robotic systems and computer technologies within the civilian commercial sector and in the international R&D community are opening up new prospects for collaboration. For DND/CF, this highlights the opportunity to work with allies and industrial partners to exploit UAVs as "force multipliers" to meet the challenges of the future battlefield. ■

For more information on Unmanned Aerial Vehicle initiatives, please contact:

Dr. Paul Pace
ph: (613) 995-6090
e-mail: paul.pace@crad.dnd.ca

or

John Evans
ph: (613) 996-1725
e-mail: john.evans@crad.dnd.ca

End Notes

[1] Damian Kemp, "Kosovo War makes UAVs part of all 'Future Combat'," *Jane's Defence Weekly*, 30 June 1999.

[2] Mr. Joseph Eash, III, DUSD-AT, "Future UAV Concepts and Operations," a presentation at the Pan-TTCP Workshop on "UAVs in the Battlefield of 2015," John Hopkins University, Applied Physics Laboratory, 2-5 June 1998.

[3] Anthony H. Cordesman, *The Lessons and Non-Lessons of the Air and Missile Campaign in Kosovo* (Washington: Center for Strategic and International Studies, 1999), p. 209.

[4] United States Air Force Science Advisory Board, *New World Vistas: Air and Space Power for the 21st Century*, Washington: United States Air Force, 1995. The US Air Force and Defense Advanced Research Projects Agency (DARPA) have already agreed to jointly develop unmanned combat air vehicles (UCAV).

[5] TTCP is comprised of Australia, Canada, New Zealand, the United Kingdom, and the United States.